NAME: Key
Ch. 6 review

reject Ho

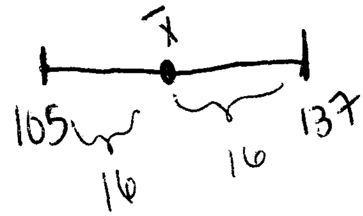
1. P-value = 0.035.
   a. At alpha = 0.05, is this result significant? yes
   b. At alpha = 0.01, is this result significant? no

2. I have an 85% confidence interval that is (6.3, 9.4).
   a. Which of the following could be the 92% confidence interval? D
   b. Which of the following could be the 81% confidence interval? B

   (A) (6.5, 10.3)
   (B) (6.6, 9.1)
   (C) (6.1, 9.2)
   (D) (5.3, 10.4)
   (E) (6.3, 10.2)

$\bar{x} \pm m$

3. I have a confidence interval that is (105, 137).
   a. What is the margin of error? 16
   b. What is the estimate? 121



4. What are the 3 things we can do to decrease the margin of error?
   1. decrease conf. level
   2. decrease σ
   3. increase n

5. What are the 4 things we can do to increase power?
   1. increase n
   2. increase α
   3. decrease σ
   4. consider alternative further from μ

6. For a Type I error....
   a. What is the symbol we use to represent it? α

   b. What is it (in words)? reject Ho when Ho is true

7. For a Type II error....
   a. What is the symbol we use to represent it? β

   b. What is it (in words)? fail to reject Ho when Ho is false

8. What are the 3 assumptions for inference on a population mean? (for conf. Intervals or tests of sign)

   1. SRS
   2. σ known
   3. normal pop or $n \geq 30$

9. What are the 5 steps to a test of significance?

   1. Assumptions
   2. Hypotheses
   3. Test Statistic
   4. p-value
   5. conclusion

10. A bottling machine is operating with a standard deviation of 0.12 ounce. Suppose that in a sample of 36 bottles the machine inserted an average of 16.1 ounces into each bottle. Give a 95% confidence interval for the mean number of ounces (and interpret).

State	Check
1) SRS	1) assumed
2) norm pop or $n \geq 30$	2) $36 \geq 30$ ✓
3) σ known	3) circled

$\bar{x} = 16.1$

$\sigma = 0.12$

$n = 36$

95% conf.

$\bar{X} \pm z^* \sigma/\sqrt{n} = (16.061, 16.139)$

We are 95% confident that the true avg amt. of ounces is between 16.061 and 16.139 oz.

11. A process that results in a standard deviation in diameter of 0.025 inch manufactures ball bearings. What sample size should be chosen if we wish to be 99% sure of knowing the diameter to within ±0.01 inch?

$$0.01 = \frac{(2.576)(0.025)}{\sqrt{n}} \qquad n = 42$$

12. A commercial airline buys fuel tanks from company Q. The airline thinks the company is under filling the tanks. A fuel tank is considered under filled if its amount of fuel is less than 655 gallons. A random sample of 50 fuel tanks is selected and the mean amount of fuel is calculated to be 645 with $\sigma = 18$. Test the hypothesis if $\alpha = .05$.

State	Check
1) SRS	1) circled
2) σ known	2) circled
3) norm pop or $n \geq 30$	3) $n = 50 \geq 30$ ✓

$n = 50$ $\alpha = 0.05$

$\bar{x} = 645$

$\sigma = 18$

$H_0: \mu = 655$

$H_a: \mu < 655$

$$z = \frac{\bar{x} - \mu}{\sigma/\sqrt{n}} = -3.928$$

$$P(z < -3.928) = 4.278 \times 10^{-5}$$

- We reject Ho b/c p-value $< \alpha = 0.05$
- We have suff. evid. that the true avg. amt. of fuel is less than 655 gallons.

13. A 2004 study claims that the mean time that high school students spend on homework each night is 55.1 minutes. We believe that the average has changed since 2004. We want to test this hypothesis. We take an SRS of 60 high school students and find that the mean time spent on homework each night for these students is 41.2 minutes. It is known that the standard deviation is 9.7 minutes. Test the claim using a confidence interval and using a 6% level of significance.

State	Check
1) SRS	1) circled
2) σ known	2) circled
3) norm pop or $n \geq 30$	3) $n = 60 \geq 30$ ✓

$H_0: \mu = 55.1$

$H_a: \mu \neq 55.1$

$$z = \frac{\bar{x} - \mu}{\sigma/\sqrt{n}} = -11.0999$$

$n = 60$

$\bar{x} = 41.2$

$\mu = 55.1$

$\sigma = 9.7$

$\alpha = 0.06$

$$2 \cdot P(z < -11.0999) = 1.288 \times 10^{-28}$$

- We reject Ho b/c p-value $< \alpha = 0.06$.
- We have suff. evid. that the true avg. amt. of time spent on HW is not 55.1 minutes.

$\alpha = 0.05$ $\mu = 218$
$n = 55$ $\mu_A = 210$
$\sigma = 129$

14. Suppose that light bulbs made by a certain manufacturer lasted on the average 218 hours with a standard deviation of 129 hours. We believe that the true mean is lower. Use a significance level of 0.05 and a sample size of 55. The alternative that we believe is true is 210 hours.
    a. The power of the test is calculated to be 0.713. Is this test sufficiently sensitive to detect the alternative? Why or why not?

       no. power < 80%

    b. Find the probability of Type I error

       $\alpha = 0.05$

    c. Find the probability of Type II error.

       $\beta = 1 - 0.713 = 0.287$

    d. Would the power be higher or lower for an alternative of 230 hours? How about for 216 hours?

       lower higher

    e. Would the power be higher or lower for a sample of 100?

       higher

    f. Would the power be higher or lower for a significance level of 0.03?

       lower

15. I have the following confidence interval: (139.56, 144.44). If my standard deviation is 10 and my sample size is 50, what is my level of confidence?

$$m = 2.44 = \frac{z^* \cdot 10}{\sqrt{50}}$$

$$z^* = 1.725$$

normcdf(-1.725, 1.725, 0, 1)

conf = 91.547%